

# Landsat imagery to information - June 2007 Update

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Canadian Forest Service  
Victoria, BC

Landsat Science Team meeting  
June 12-14, 2007. Corvallis, Oregon



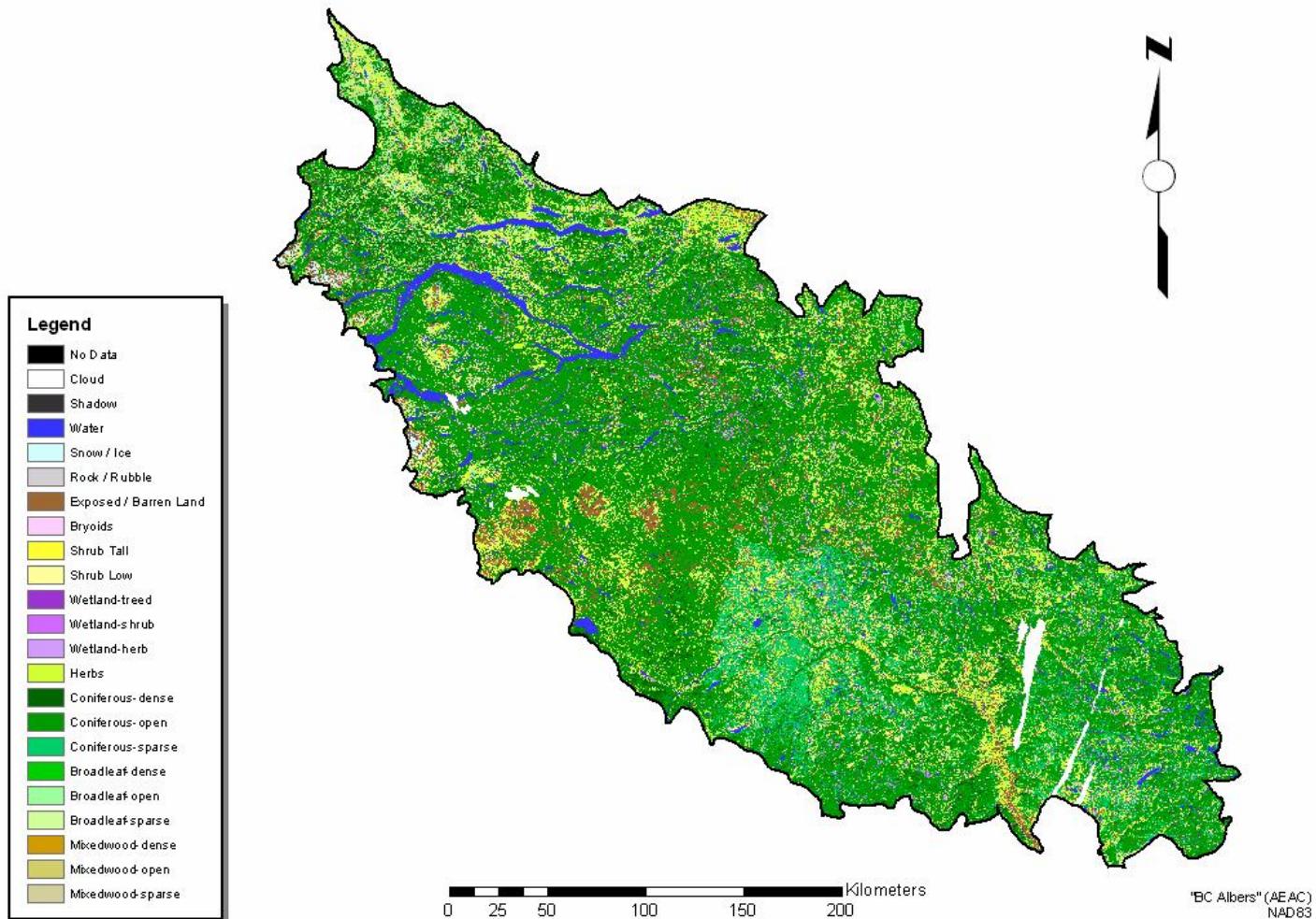
# Overview

- Cross-sensor change detection
- Comparison of SLC-on / -off for change detection
- Spectral trajectories:
  - Insect disturbance / recovery
  - Pattern and ecological integrity
  - Retrospective lidar to inform trajectories of disturbance and recovery
- National fragmentation products
- Grizzly bear habitat monitoring and modeling

# Fragmentation from EOSD LC 2000

## BC Example area

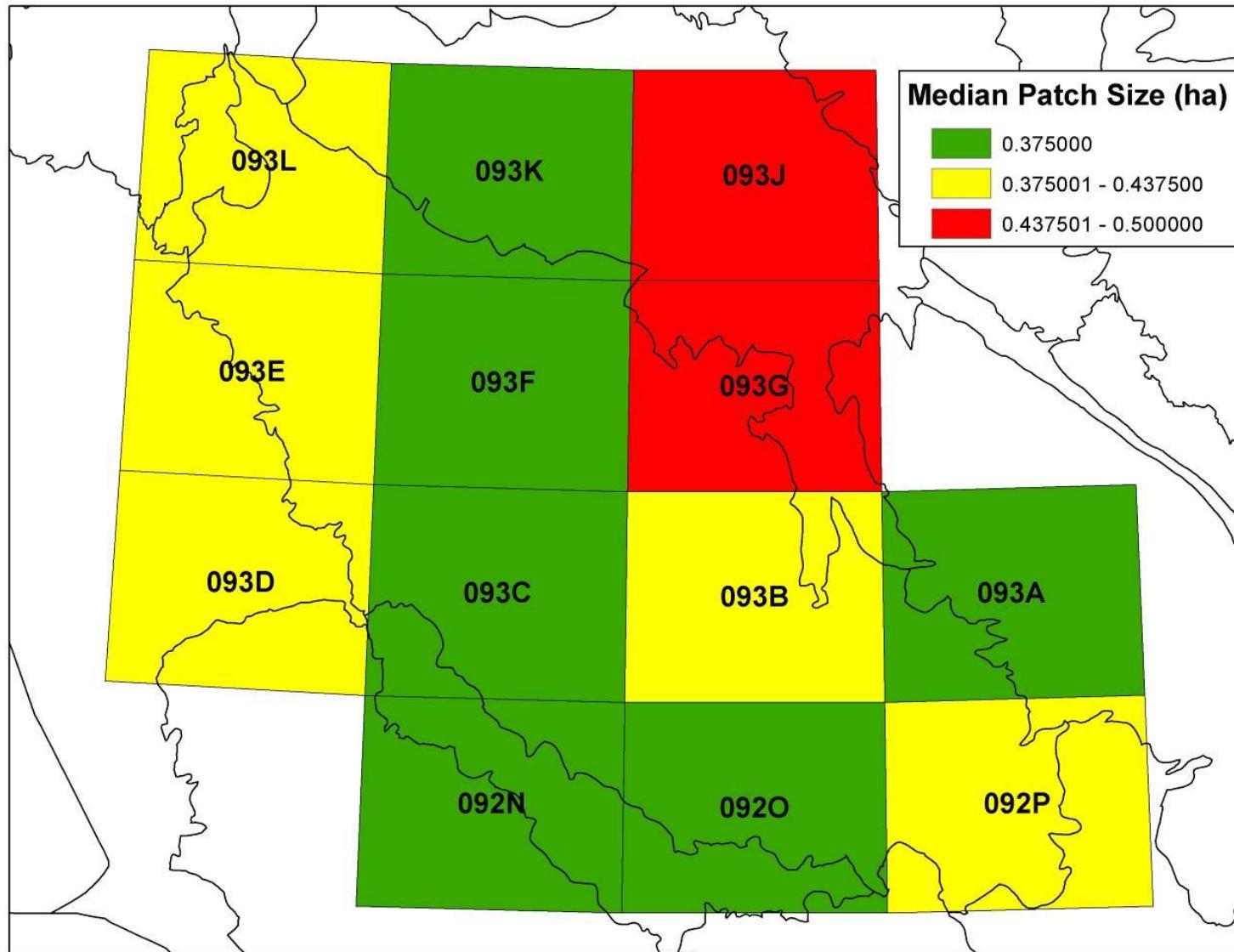
EOSD Coverage of the Fraser Plateau Ecoregion (2000)



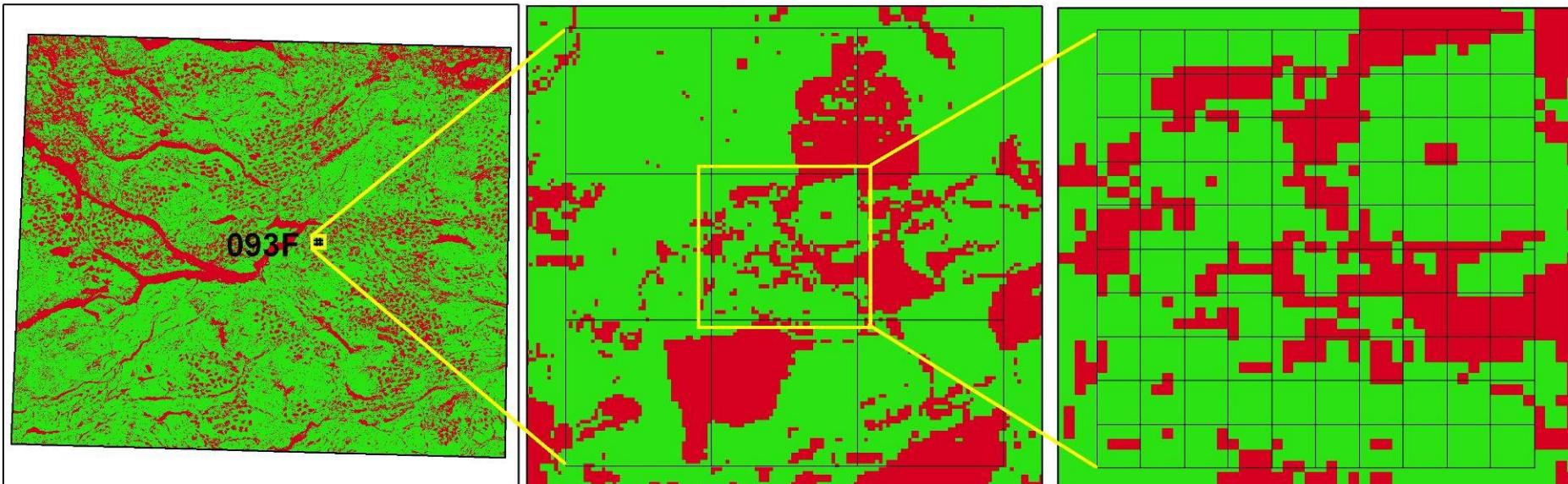
# National Fragmentation Metrics and Notes

- Metrics:
  - total area,
  - percentage of landscape,
  - number of patches,
  - total edge,
  - edge amount,
  - median patch size,
  - mean patch edge,
  - standard deviation of perimeter to area ratio,
  - area weighted mean shape index,
  - mean Euclidean nearest neighbour distance,
  - clumpiness index
  - Join counts
  - ...
  - > 80 metrics (APACK)
    - Landscape and attribute
- Considerations:
  - use, uniqueness, processing time
- 1:250K map sheet context for processing and product development
  - 610 nationally
- Products by:
  - 1:250K
  - 1:50K
  - 1 x 1 km cells
  - 100 x 100 m cells
- In support of BioSpace

# Global fragmentation information representative of 1:250K mapsheet



# Cascading scale: Final product, 1 Ha cells



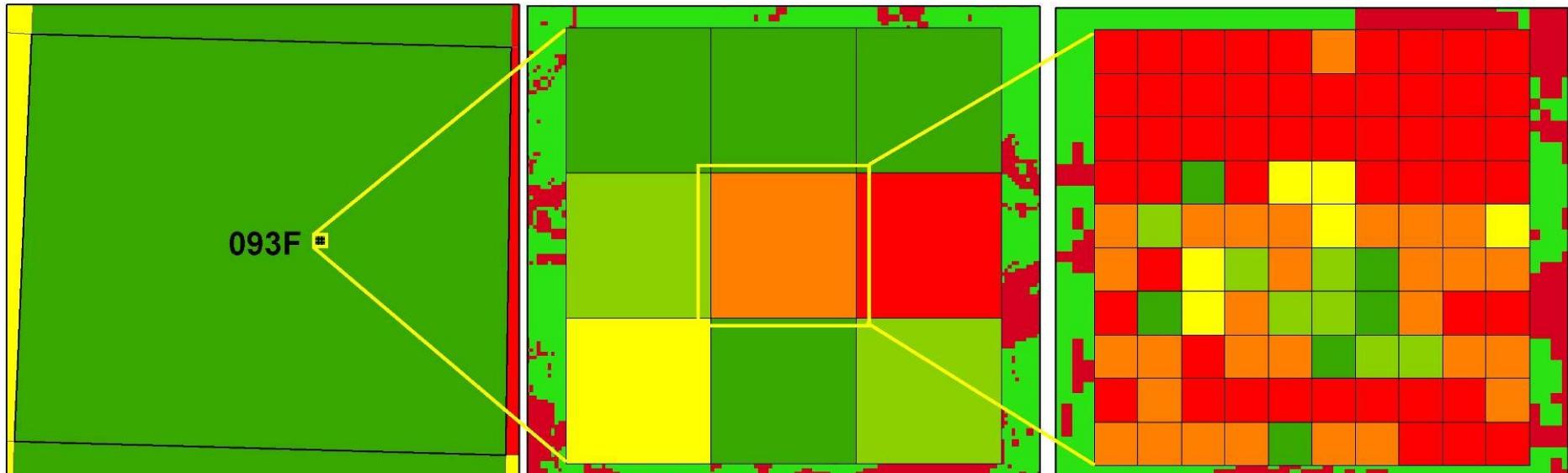
112000 m by 135000 m

1000 m

100 m



# Example Attribute: Median Patch Size (Ha) over 3 scales



Median Patch Size

0.375000
0.375001 - 0.437500
0.437501 - 0.500000

Median Patch Size

0.125000 - 0.312500
0.312501 - 0.750000
0.750001 - 1.500000
1.500001 - 3.187500
3.187501 - 36.187500

Median Patch Size

0.062500 - 0.125000
0.125001 - 0.312500
0.312501 - 0.437500
0.437501 - 0.625000
0.625001 - 2.000000

# Grizzly Bear – Mountain Pine Beetle

- Habitat mapping
- Habitat change
  - Harvesting
  - Industry
  - Insect mitigation
- Bear response
- Interactions
- Future habitat
- Need annual and within year information



Investigators: Gordon Stenhouse, Greg McDermid, Steven Franklin, Nicholas Coops

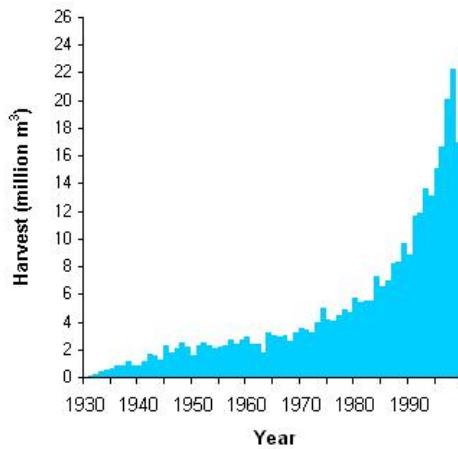


Photo: Scott E. Nielsen



Canada

# Forest Disturbance in Western Alberta



# Grizzly Bear Locations

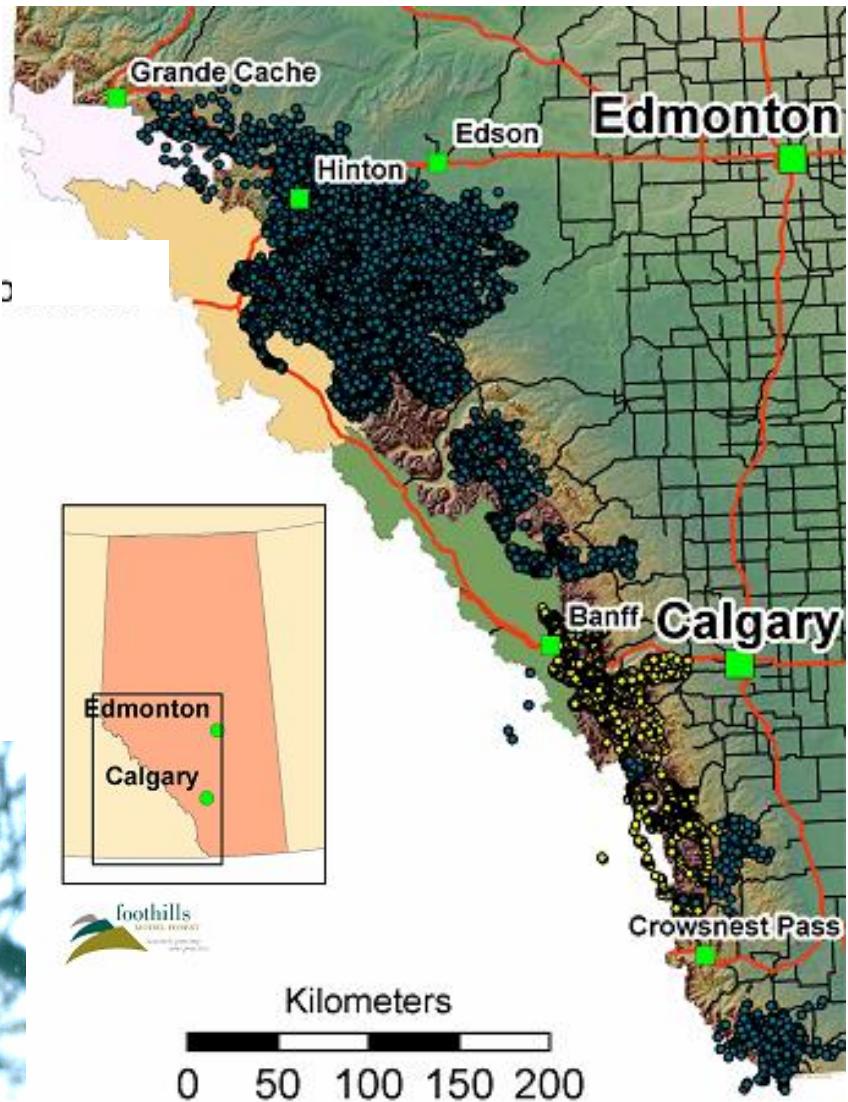
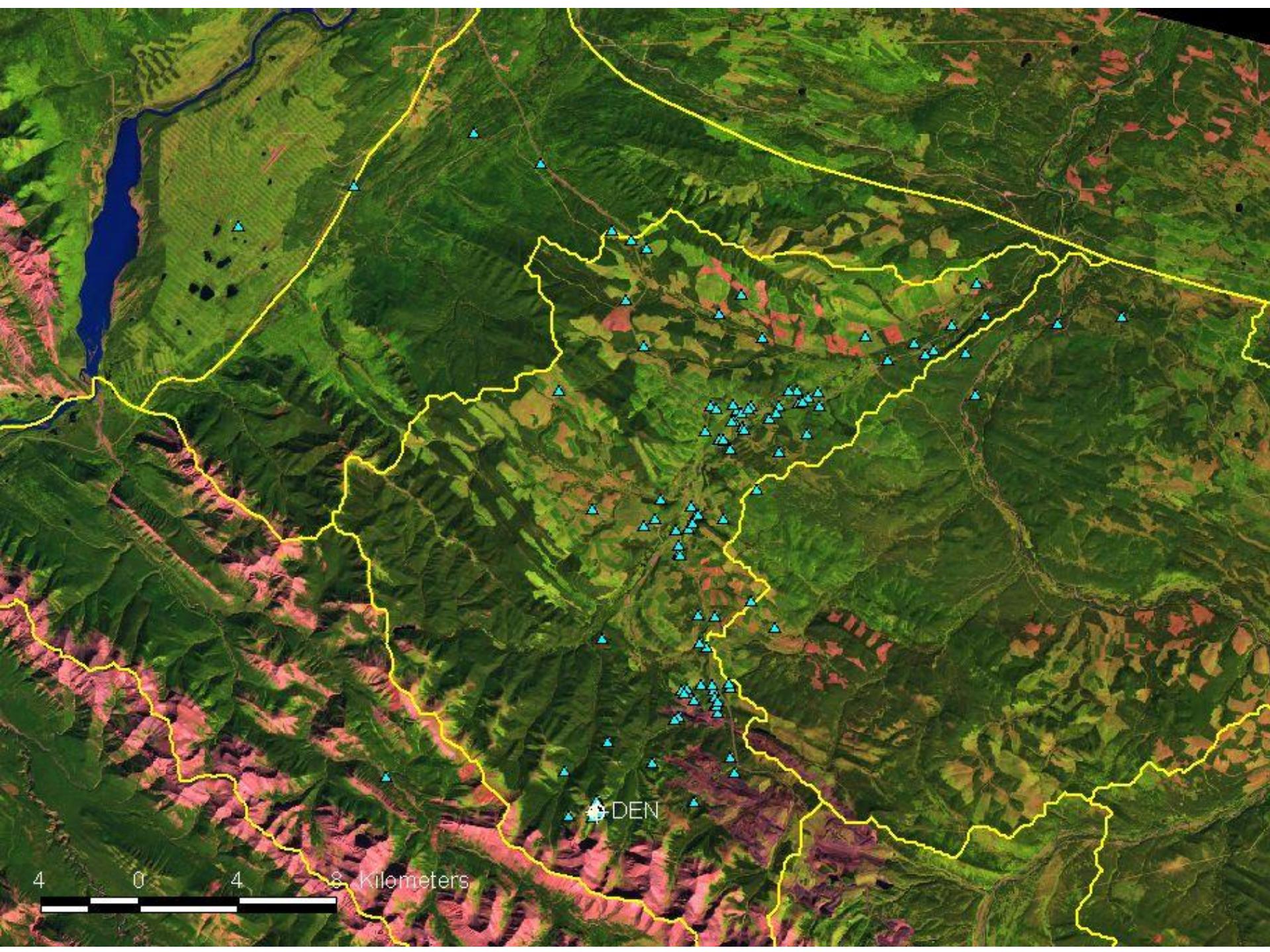


Image sources: Foothills Model Forest

Canada



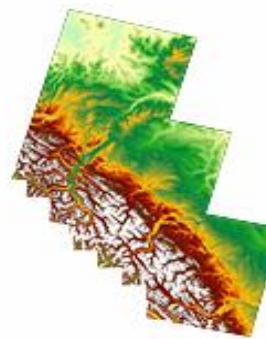
4 0 4 Kilometers

DEN

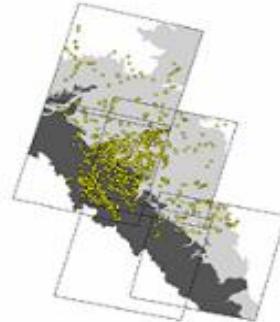
**Landsat Orthomosaic**



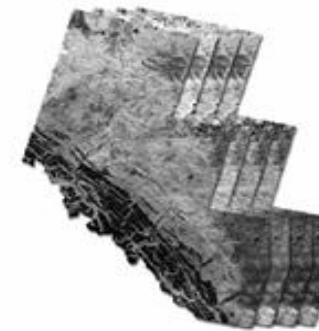
**Digital Elevation Model**



**Ground Biophysical Data**



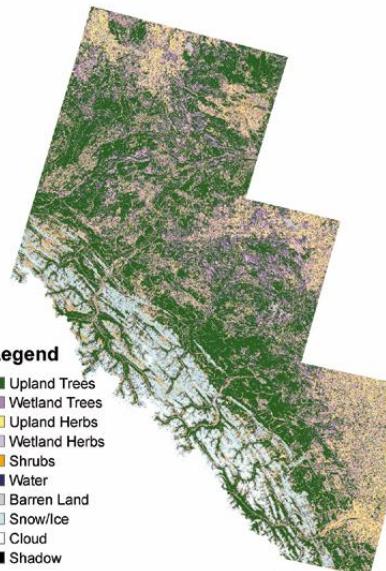
**MODIS 14-day VI Composites**



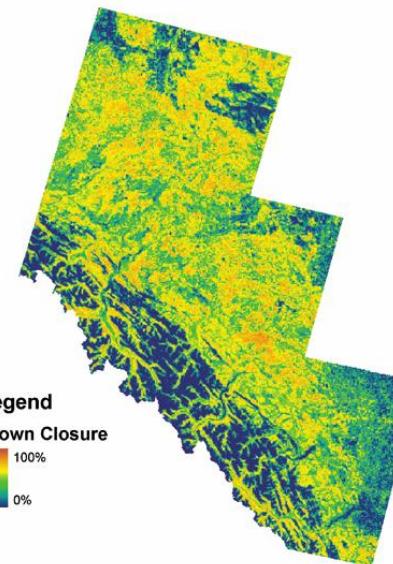
**Natural Subregions of Alberta**



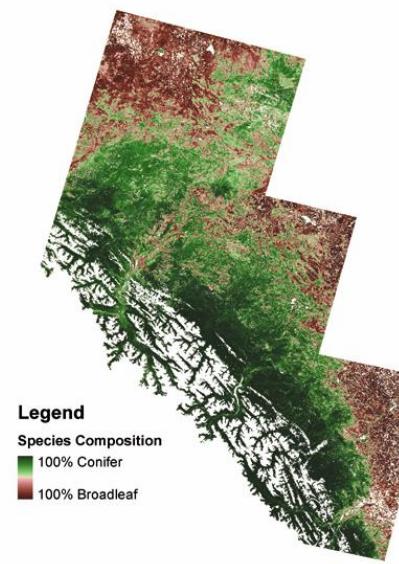
**Landcover**



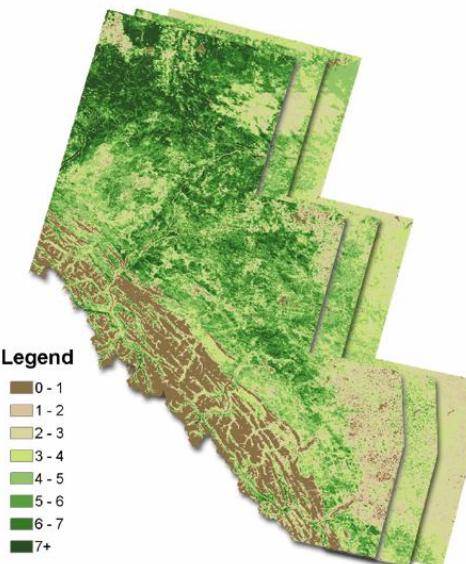
**Crown Closure**



**Species Composition**



**Leaf Area Index**



2004

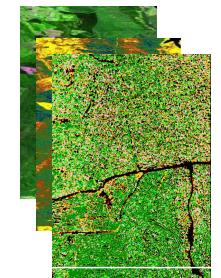
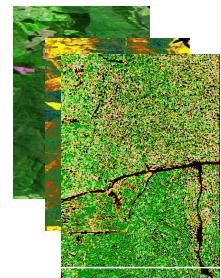
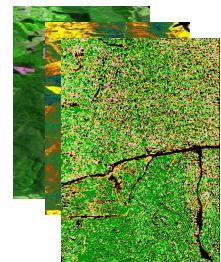
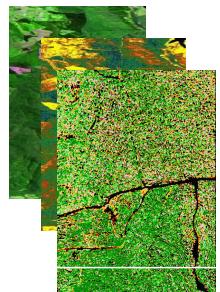
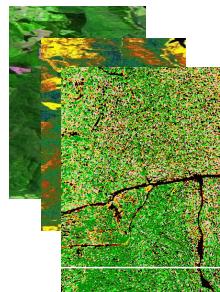
2005

2006

2007

2008

Existing UC annual  
land cover, crown  
closure species  
composition,  
phenology

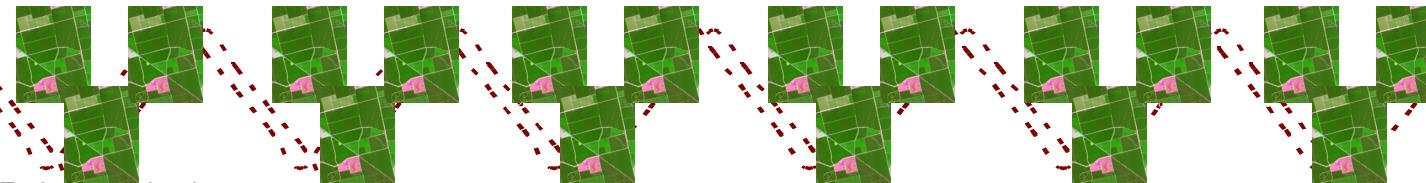


MODIS

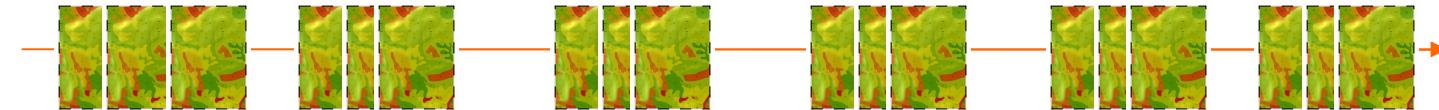
16 day R, NIR, NDVI

Synthetic Landsat  
(STAR-FM)

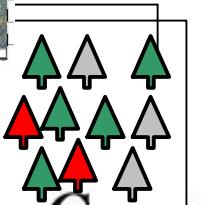
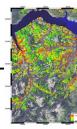
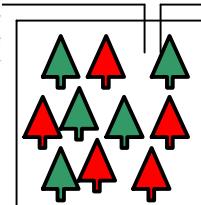
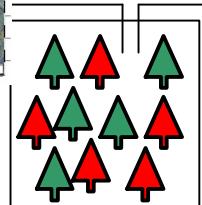
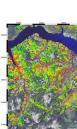
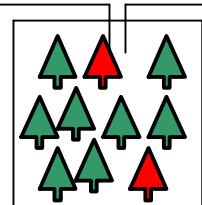
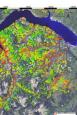
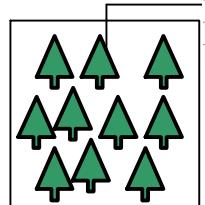
**Seasonal (16 day) maps of crown closure, species composition, phenology**



**Seasonal (16 day) derived disturbance, from MPB, change in land cover and modelling**

**Annual Disturbance**

Wulder MPB  
EDWI Methodology  
Plus spatial data (forest  
inventory, radiation, etc)



# Thank you.

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<http://www.pfc.forestry.ca/profiles/wulder>

